

## **PART ONE: FRAMING THE SITUATIONS**

### **A. Why Worry About Exports?**

Appalachia, like the rest of the United States, looks increasingly to foreign markets for its sources of economic growth. National economic data, backed by mounting research, underscores the importance of exports to the region's industrial Competitiveness. For too long, U.S. firms have taken the country's large and expanding domestic markets for granted and assumed that U.S. customers could absorb all of their production and generate continuing growth. Thus, they assumed, there was little need to aggressively seek customers outside U.S. borders.

As a result, U.S. companies, according to Conway and Nothdurft, have been “the world's biggest export underachievers.” Exports as a percent of GNP are less than half of what they are in Germany, Japan, Canada, and the United Kingdom combined. But this situation is rapidly changing. Last year total exports for U.S. firms were 52 percent higher than in 1990.<sup>12</sup> A small number of the nation's largest companies (about fifty) still account for almost half of U.S. exports, but with rapid rises in imports competing for domestic markets, consolidation of retail markets, and growing opportunities abroad, exporting has become an important consideration—if not imperative—for firms of all sizes.

Smaller firms in particular have been slow to exploit export opportunities. Often their management lacks the specialized expertise, resources, access to necessary information, and capital of large companies. In 1995, only 14 percent of firms with between 20 and 100 employees were direct exporters, and in almost half of those firms no more than five percent of sales were exported. Less than nine percent of firms with fewer than 30 employees export. These data have led to government to focus on SMEs, and since the enactment of the Trade and Competitiveness Act of 1988, U.S. federal and state policy has paid greater attention to the capabilities and competencies of small and medium-sized business enterprises (SMES) with respect to both meeting market requirements and levels of modernization. In 1993 the recommendations of the President's Competitiveness Policy Council contained in its “Trade Policy for a More Competitive America” led off by exhorting the government to “stimulate an ‘export mentality’ by concentrating on the untapped export potential of small and mid-sized businesses.”<sup>3</sup>

Exports, we know, create jobs, and companies that do export exhibit significantly more (statistically different) of the characteristics associated with higher performance companies—higher value added per employee, higher wages, salaries and benefits, higher capital expenditures per employee, and higher investments in plant and equipment per employee. High technology industries tend to export more than lower technology industries, but the differences in indicators of performance hold, in general, across all sectors of manufacturing. In transportation equipment, for example, value added per employee for exporters was 48 percent higher than for non-exporters, investment in plant and equipment was 47 percent higher, and salaries and wages were 23 percent higher.<sup>4</sup> Exports also have a large multiplier effect. Every single manufacturing job directly associated with exports creates slightly more than two additional jobs indirectly associated with exports.<sup>5</sup>

It is not at all surprising to find that the vast majority of exporting in the United States is done by large, multi-branch corporations—which could account for the higher average wages in exporting firms since larger companies on average pay higher wages. But since much of the data used to measure exports—such as the *Annual Survey of Manufacturers*—includes large establishments, it is difficult to capture accurately the full export value of the small and mid-sized companies that comprise a large proportion of the industrial base of Appalachia. Data analyses have shown, for example, that most of the value of exported goods comes from lower tier suppliers. These firms are indirect exporters and may have to meet demands of export markets even if they do not transact business directly.

## **Driving Exporting and Modernization**

Government-sponsored technical assistance programs, for the most part, have separated the related goals of and support services for technological development/utilization and market development/exports. Consequently, each set of programs is driven by a different set of assumptions about the competitiveness of SMEs.

- Government programs that promote greater adoption of technologies (popularly called "industrial modernization") are based on an accumulation of survey evidence showing that, on average, SMEs in the U.S. lag behind SMEs in leading foreign competitor nations in technology adoption. Experts contend that American SMEs can and will be more competitive in global markets and better able to export if they increase and expand their uses of advanced technologies. Engineering problems drive the activities of agencies that are formed to assist with modernization and staffed by technicians and engineers more interested in and knowledgeable about improving product than expanding customer bases. Such government-assisted efforts include industrial and manufacturing extension services, quality certification programs, technology transfer programs, university-based technology centers, community colleges' continuing education divisions, technology trade shows, and state technology councils.
- Government programs that promote exporting also justify their activities on surveys—but about markets, not technologies. These data inevitably show low proportions of exporters among SMEs. Programs to encourage exporting, experts assert, may require firms to modernize because new customers are likely to be more demanding. For example, western European nations that have high quality standards and Pacific Rim nations with demanding delivery schedules as well as quality requirements will cause SMEs to invest in new technologies. Market trends and opportunities drive programs that work with marketing—particularly exports—and their staffs are often former marketing and sales managers and economists, many with little knowledge of production issues. These include state-operated foreign trade offices, trade missions, small business development centers, world trade centers, export service directories, trade shows, and trade lead services.<sup>6</sup>

Unfortunately, the value of technology in opening new markets has been difficult for many companies to accept because equipment manufacturers have promoted their new technologies far more as a labor saving than capacity building device. For decades, machine builders advertised the labor reductions possible with their equipment as justification for investments. In the 1980s,

however, when quality and flexibility emerged as the new foci of modernization, companies began to invest in new technology not just for cost savings but to also meet rising quality standards and produce smaller runs of more specialized goods. In the 1990s, time is emerging as yet another new competitive advantage, and modernization is also being pursued to reduce time to market or order.

This policy dichotomy between modernization and marketing divides the delivery of services and creates unnecessary confusion for the smaller firms because the two strategies of modernization and market development are not separated in the decision-making processes of small businesses managers and often handled by the same people. In fact, programs that promote modernization ultimately will expand market opportunities, and policies that promote exports ought to eventually require modernization. To adopt new technologies, SMEs have to justify their investment and training costs on a cash flow basis, which generally is related to new markets and sales growth. At the same time, firms considering new markets often find that they need to modernize in order to be “export-ready,” and meet the quality, design, and delivery standards of their competition. Most government programs are not organized to address these issues holistically.

## **Fusing Modernization and Exporting**

Where programs are becoming more demand driven, the barriers between modernization and export assistance programs are fading, and distinctions between production and marketing capabilities are diminishing. For example, members of the new Manufacturing Extension Partnership (MEP), established by the National Institute of Standards and Technology (NIST) in 1988 to enhance technology transfer, increasingly are being asked to provide their clients with assistance in domestic and foreign market development. Each of the Appalachian states has a state program supported by NIST aimed at assisting Appalachian SMEs modernize, e.g., the West Virginia Partnership for Industrial Modernization which includes the Richard C. Byrd Center, Marshall University, and West Virginia University; the Virginia Alliance Competitive Manufacturing, which includes the A.L. Philpott Manufacturing Center, the Manufacturing Technology Center at Wytheville Community College, and the Center for Innovative Technology; the Southeastern Manufacturing Technology Center in South Carolina; the North Carolina Manufacturing Extension Partnership headquartered at North Carolina State University; and the Southwestern Pennsylvania Industrial Resource Center in Pittsburgh.

Further, a new set of programs established by modernization advocates to encourage inter-firm collaboration (“networks”) as a means for enhancing the capabilities of SMEs found much greater interest in marketing and exporting than in technological advancements. Accordingly, these centers recognize that exporting is a leading driver for competitiveness, and therefore technical assistance is now a priority of many of the Manufacturing Extension Partnership centers. The more effective programs are those able to address the multi-dimensional needs of SMEs, which include not only technology and training, but the skills, finances, and contacts to be able to export.

Most programs that target SMEs, however, operate on very small budgets, have little long-term security, and are asked to very quickly move toward self-sufficiency. This drives them toward

more urban areas, larger companies that are better able to pay for services, and shorter-term, less strategic, projects that can yield quicker returns. Modernization programs, in particular, continually struggle to maintain a presence in rural areas and there are few provisions for the diseconomies of scale associated with more rural areas and very small companies.

## **Exporters, Sectors, and Industry Clusters**

At the heart of this project is the knowledge (based on existing research) that virtually all small and mid-sized businesses do business in the context of complex production and social systems that include other firms with similar or complementary products, materials, supplies, services, resources, capital, and distribution channels. To take advantage of external economies of scale and access to information and innovation, firms with common needs or interests tend to cluster together in spatially bounded regions.<sup>7</sup> Although clusters are most often designated by standard industrial classifications (SICs) of their products, firms also cluster around other commonalities. The element binding firms together may be a marketing strategy, exemplified by the crafts cooperative Watermark, in North Carolina whose products include ceramics, wood, and fabrics. The element could be a common core technology, illustrated by the optics and imaging technologies in Rochester, New York, or biotechnology in central Kentucky. It may be a similar set of labor market skills, such as the metals industries in the multi-county Region 2000 of central Virginia.

### **Clusters Count, But Clusters are More Than “Counts”**

Defining and understanding clusters is much more difficult than spotting concentrations. It involves a set of intangible factors, e.g., social infrastructure; access to information, services, and capital; and linkages to other markets. An industry cluster has a critical mass of companies with like interests, a set of specialized services, an experienced labor market, suppliers, and relevant R&D. Every agglomeration of companies with a common interest does not function effectively as a cluster and produce synergy. Synergy depends on relationships within the cluster and the ability and willingness to recognize and act on complementarities and common interests by forming various kinds of alliances, sharing non-proprietary information, and challenging each other to improve and innovate. It depends on the entrepreneurial energy and the rate of new business spin-offs. And it depends on the presence of leadership and a collective vision for the cluster. These process-oriented attributes depend in turn on the region's social infrastructure—the associations and organizations that bring business people together where they can get to know and trust each other.

The factors that affect the flow of information and foster alliances, we believe, also influence success in export readiness and activity. Research on clusters demonstrates that high concentrations of companies making similar products, complemented by their suppliers generate sufficient demand to attract specialized services and labor markets, stimulate flow of information about market opportunities and emerging trends, and facilitate inter-firm cooperation. Clustering of like or related businesses also leads to the obvious conclusion that specialized factors are more important to a region's economy than generic factors.

Although ARC specifies sector-based clusters, in investigating clusters, the research team looked for firms with products complementary to those of the targeted sectors, which also might be able

to take advantage of similar export services and markets. For example, the firms that comprise the industrial machinery sector are not simply an independent cluster but inputs in other clusters. The industrial machinery cluster in South Carolina emerged from the needs of the textile and knitting industries in the 1950s, electronic components is an input to the industrial machinery industry, and plastic parts are required to produce many electronic components.

## **B. Choosing Appalachia's Key Industry Clusters**

Despite the steady march of jobs from the production sector to the service sector, Appalachia remains a manufacturing intensive region. It accounted for about 1.9 million jobs in 1993. The northern part of the region (Pennsylvania, New York, and Ohio) and a southern wedge from South Carolina running through Alabama and Tennessee have the largest concentrations of manufacturing employment. As shown in Table 1, non-durable goods industries are more concentrated in Appalachia than in the rest of the U.S.

The selection of industries for analysis is based in part on a prior study by the Kenan Institute of Private Enterprise at the University of North Carolina<sup>8</sup> of the structure of manufacturing within the ARC region, as defined by maps of concentrations of industries within ARC's local development districts (LDDs) according to their three-digit Standard Industrial Classifications\* (SICs). The study compares ARC to national profiles and differentiates between small (less than 100 employees) and mid-sized firms (100 to 500 employees). It then estimates the "export potential" for each sector by applying national data on export value per job at the two-digit SIC level to the ARC industrial profiles and calculates a hypothetical surplus or deficit based by comparing the export value per job for the ARC states' economies to the national economy. For example, food processing shows a deficit of about 25 percent in exported goods per job compared to the national figure because the industry is underrepresented in Appalachia. In contrast, furniture shows a surplus of nearly 50 percent in exported goods per job because it is has proportionately more employment in the region. The investigators' assumption was that some industries are more inclined to export than others and therefore the region should direct its efforts to industries with the most export potential.

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\* SIC refers to the Standard Industrial Classification system (SIC) used to classify each industry in the United States economy. This report uses the system detailed in 1987 *Standard Industrial Classification Manual* by the Executive Office of the President, Office of Management and Budget, National Technical Information Service, Springfield, VA.

**Table 1**  
**Concentrations of Industries in Appalachia, 1993**

<b>SIC</b>	<b>Industry</b>	<b>Ratio of % or ARC mfg employment to % of National mfg employment</b>
20	Food processing	0.79
21	Tobacco	1.50
22	Textiles	3.40
23	Apparel	1.81
24	Wood products	1.34
25	Furniture	1.96
26	Paper	0.94
27	Printing & publishing	0.56
28	Chemical	1.02
29	Petroleum	0.67
30	Plastics	1.06
31	Leather	1.00
32	Glass	1.46
33	Foundries	1.68
34	Fabricated metals	0.87
35	Industrial Machinery	0.85
36	Electronics	0.85
37	Transportation	0.47
38	Instruments	0.52
39	Miscellaneous	0.63

To make an initial selection of clusters for this analysis, defined by three-digit SICs, the Appalachian Regional Commission used the following factors:

- Kenan's Local Development District (LDD) maps of sector employment and firm concentrations of small and mid-sized companies;
- presence of sector concentrations in multiple areas (and states) within the region;
- a mix of traditional and mature sectors with more rapidly changing sectors; and
- potential value to region.

Export intensity was not a major consideration in the selection, and some of the clusters selected had low rates of exports. The process resulted in two traditional sectors (household furniture and knitting mills); four more technologically advanced sectors (plastic parts, electronic components, industrial machinery not elsewhere classified, and medical devices); and one emerging industry believed to have high growth potential but not identified by a single set of SICs (environmental technologies).

**Household furniture (SIC 2510)** The household furniture manufacturing industry is made up of producers of wood, upholstered, metal and other furniture, and mattresses and bedsprings. In the second half of the 1990s, household furniture shipments in constant dollars are expected to

increase three to five percent annually. Total U.S. employment in household furniture manufacturers was 250,000 in 1992 with the ARC region home to approximately 75,000 of these jobs. North Carolina, Mississippi and Alabama had the highest concentrations—approximately 24,000, 19,000 and 5,000 jobs, respectively.

**Industrial machinery (SICs 3540, 3550, 3560, & 3590)** This category includes four SIC codes: machine tools, special industry machinery, general industrial machinery, and industrial machinery not elsewhere classified. The companies with these SICs produce a wide range of specialized machinery for a variety of industrial processes—e.g., textile, woodworking, paper and printing, and food processing. They also produce machinery common to many manufacturers such as furnaces, pumps and pumping equipment, pistons, ball and roller bearings, compressors, and blowers and fans. This cluster, combined with the closely related 3550 and General Industrial Machinery (3560), employs 721,000 in the United States in 1992 and almost 70,000 in the ARC region. Pennsylvania (20,000), Tennessee (9,000), South Carolina (9,000), and New York (7,000) have a significant portion of these jobs.

**Electronic Components (SIC 3670)** Components are fundamental building blocks for the electronics industry. A wide variety of products make up the electronics components category, including electron tubes, printed circuit boards, semiconductors and diodes, capacitors, resistors, coils and transformers and connectors. Demand for electronic components comes primarily from the computer, telecommunications, instrumentation, medical equipment, and transportation industries. These components accounted for about 507,000 U.S. jobs in 1992. The ARC region has 38,000 electronics components manufacturing jobs, with heavy concentration in western New York (17,000) and Pennsylvania (9,000).

**Environmental Technologies and Services (SICs N/A)** The environmental technologies and services industry includes industrial air pollution control equipment, water and wastewater systems, solid waste recycling, hazardous and toxic waste technologies, and the emerging pollution prevention industry. This relatively young industry has evolved in response to enactment and enforcement of pollution control legislation in the United States and growing concerns about the risks and costs of pollution. Because the environmental equipment industry includes many diverse products, services, and technologies, it is extremely difficult to estimate market size or employment levels in environmental goods and services using SIC code-based data. Industry analysts estimate the national environmental technologies employment reached 1,263,000 in 1994. Employment estimates for the ARC region are not available.

**Medical Instruments and Supplies (SIC 3840)** The U.S. medical and dental instruments and supplies industry is a diverse and technologically dynamic sector consisting of surgical and medical instruments, surgical appliances and supplies, dental equipment and supplies, X-ray apparatus and tubes, electromedical equipment, ophthalmic goods, and used and refurbished medical equipment. Nationwide, industry employment was 253,000 in 1992, with 16,000 in the ARC region. Tennessee, Georgia and Pennsylvania have the strongest presence, with a combined total of about 10,300 (2,700, 2,200 and 5,400, respectively).

**Plastics Products (SIC 3080)** Companies within this cluster produce plastic parts for use by the electronics, health care, construction, transportation, automotive and food packaging industries. Production processes involve the transformation of primary plastic inputs into plastic shapes

with specific characteristics. There were 637,000 plastics products jobs in the U.S. in 1992. In the ARC, employment in companies producing plastics products was about 60,000. Pennsylvania, with 18,000 jobs, and eastern Ohio, with 6,000, together make up a significant portion of this employment.

**Knitting mills (SIC 2250)** Knitting mills are part of the textile industry but face pressures more similar to the apparel industry. The category consists of producers of hosiery, socks, knit underwear and outerwear, and knit fabrics. Total U.S. employment in knitting mills was almost 190,000 in 1992. About 51,000 of the jobs were in the ARC region, with North Carolina (20,000), Alabama (12,000) and Tennessee (7,000) having the highest concentrations.

Given these as starting points for the study, the research team set out to refine the sector selection in order to apply a cluster approach and search for interdependencies among firms that affected competitiveness and export readiness. This process resulted in two modifications to the original selection. First, plastic parts was separated from plastics commodities to focus on a single type of process. Second, the classification for industrial machinery was expanded to include three closely related three digit sectors: metalworking, general, and special industrial machinery.

## C. Posing the Questions

This report is based on a number of assumptions about what makes Appalachian businesses and economies competitive. The first is **clustering**: although the region as a whole is diversified, certain types of businesses are more likely to be found in some areas than others, and related businesses tend to cluster in particular sub-regions. This proximity to one another gives them certain advantages over firms that are more dispersed and isolated.

The second is **connections**: when companies in a region are interdependent, i.e., formally and informally rely on each other for information, specialized services, parts, supplies, workers, technologies, and sales, they are more competitive collectively than companies in regions that are not well connected to each other. Further, clustered companies that are linked to external sources of information, innovations, and customers—throughout the world—are more competitive than companies that are provincial and unconnected.

The third is **competencies**: companies that learn about and use the most advanced and appropriate technologies, that invest in the skills of their work force, and that either possess or can access expert advice and assistance are more competitive than those that do not.

These three assumptions—clustering, connections, and competencies—led to a series of questions about the export readiness, competitiveness, and interdependencies of Appalachian businesses.

### Export issues and capabilities

- Who exports what and where? What are the major exported products and what countries are their major destinations?



- What entities help SMEs export and how do SMEs rate their services? Is the propensity for an SME to export related to the strength and accessibility of export assistance and support services?
- How important is exporting to Appalachian SMEs?
- What conditions impede exporting and what are SMEs' needs?

#### **Competitiveness issues and conditions**

- What must SMEs do to prepare for exporting? Are SMEs that export more likely to be modernizers because of the standards imposed by foreign markets and competition?
- What organizations help SMEs improve their operations and become export ready?
- What advantages or disadvantages do SMEs ascribe to their location? Are rural SMEs less likely to be exporters than urban SMEs due, for example, to distance from distribution hubs, access to fewer specialized services and information, and increased transaction costs?

#### **Interdependencies and connections**

- What special advantages accrue from proximity to and relationships with other SMEs?
- Are firms that are embedded in tight production and social systems better able and more apt to export?

### **D. Industry Clustering within the Appalachian Region**

While the preliminary data analyses used to help select sectors showed absolute concentrations of firms by SIC code, they did not indicate relative importance to local economies and thus generally favor large urban population concentrations. An alternative measure called a "location quotient" indicates relative concentrations. The location quotient is a ratio of the fraction of a region's employment (or number of establishments) in a specific industry compared to that same fraction of the national employment (or establishments) in that same sector compared to total national industrial employment (or establishments).

$$L.C. = \frac{\frac{\text{Number of employees (establishments) in sector, in region}}{\text{Total number of employees (establishments) in region}}}{\frac{\text{Number of employees (establishments) in sector, in nation}}{\text{Total number of employees (establishments) in nation}}}$$

Thus, a location quotient of 1.0 indicates that a region is at the national average while a location quotient greater than 1.0 indicates a higher than average concentration of that sector in a region. It is important to note that a high employment location quotient for employment may be due to a dominant branch plant rather than a cluster of firms. Further, these measures were based on the U.S. Department of Commerce's 1993 County Business Patterns, which Generally undercount employment and establishments.

Location quotients for the six clusters that could be defined by SIC codes were calculated for each county in the ARC region and then combined with the quantity of jobs and establishments to identify potential clusters of firms in groups of contiguous counties. The analyses, described in detail in individual case studies in the appendices, pointed to the locations most likely to

benefit from interdependencies and produce synergy. A small number of counties had high employment locations quotients but small numbers of companies and were eliminated from cluster analysis.

## **Gathering information**

After selecting the sites, the field research teams set out to learn about the components of the clusters—the exporting and non-exporting firms; the services, institutions, and agencies that support them; and the infrastructures that undergird them. The goal was to identify factors that influence exporting, export readiness, and competitiveness, find out how proximity influences outcomes, i.e., whether clustering of the industry produces synergy, and whether a collective identity exists and does enhance performance.

The main source of information was a survey of small and mid-sized exporters, non-exporters, and support services conducted over the telephone and followed up by fax. The survey also included technology extension services, banks, trade associations, marketing services, freight forwarders, trade centers, and community colleges. In each cluster, the target was at least ten exporters, ten non-exporters, and six support services. Names and addresses for companies in the relevant SICs in each cluster were obtained from Dunn & Bradstreet, state catalogues, and other technical assistance providers.

Each research teams tried to connect with a local organizations known and respected by the potential respondents to identify exporters (general business data bases do not identify exporters), send letters of introduction and support and, in a few instances, to help collect information, provide an entr?, and secure cooperation. For example, the hosiery trade association and community college in North Carolina, industrial resource center in Pittsburgh, Plastics Technology Center in Erie, and the manufacturing extension office in Binghamton, New York all lent their names and assistance. One consequence of asking local agencies to assist in gaining access to firms, however, is that the sample of respondents is biased in favor of members or customers of these organizations, and therefore they are not statistically representative of the universe of manufacturers in the cluster. The major impact of that bias is toward greater use of agency provide information and services.

## **E. National and Regional Trends in Exports**

Increasing the value of goods and services exported from the United States in order to reduce the U.S. international trade deficit is a national goal. But equally important, export sales represent revenues for U.S. industry and jobs for U.S. workers, and individual states and regional organizations have adopted the goal of increased export sales to provide income and support employment. Consequently, they want to know just how successful they are. But good information by sector at the state level is poor and county level non-existent.

The Massachusetts Institute of Social and Economic Research (MISER) refines data compiled from Shippers Export Declarations to produce a data series that is published in the National Trade Data Base. These data show the value and destination of exports from each state by two-

digit SIC industry. For the six target industries that are defined by SIC codes, export statistics in the analysis are based upon the MISER data in the National Trade Data Base. For the target industry environmental technologies, which cannot be defined by SIC codes, data produced by Environmental Business International Inc. is used for the analysis. Data sources are described in more detail in Appendix G, Data Sources and Methodology.

The MISER data has two limitations. First, only the state of West Virginia is wholly within the Appalachian Region; the other twelve states are parts of states. Since no sub-state data exist, for the national and regional trends analysis, statewide data serves as a surrogate for the ARC regions of each state. Second, MISER data describes two-digit SIC industries, but ARC defined six of its target industries at the three-digit SIC level or lower.

The export performance analysis uses national and state gross product data provided by the U.S. Department of Commerce Bureau of Economic Analysis (BEA), but the most recent gross state product (GSP) statistics available from BEA are for 1992. The 1993-1995 GSP for the ARC member states was estimated using recent growth in BEA state personal income data and trends in the relationships between personal income and GSP (methodology described in Appendix A).

Products of the trade flow analysis include an evaluation of overall export performance indicated by the contribution to that income that exports of goods make to the economy—for the Appalachian Region and individual member states. Comparisons between export performance of ARC states and national averages assess progress toward the ARC strategic plan objective, “Appalachian export performance will increase up to the national average.” The analysis begins with an overview of the last three years’ national exporting trends and then moves to more detailed analysis of the Appalachian States’ export performance in the target industries selected by ARC.

## **Recent Export Trends**

Between 1993 and 1995, the total value of goods exported from the United States increased by just over 25 percent—from \$432 billion to \$529 billion. Exported goods include manufactured products (the output of SIC industries 20 through 39), commodities such as coal or wheat, and miscellaneous materials, which include scrap and waste. The value of manufactured exports for those categories increased at the slowest rate, an even 25 percent, while the value of commodity exports increased by just over 31 percent. Table 2 reports growth in U.S. exports of goods for three categories.

**Table 2**  
**Total Value of Goods Exported, USA, 1993-1995 (Billions of Dollars)**

TYPE OF GOODS	1993	1994	1995	1993-95 Change
Manufactured Goods	\$423.2	\$468.9	\$529.0	\$105.8
Commodities	\$31.7	\$32.6	\$41.6	\$9.9
Misc., Including Scrap & Waste	\$9.9	\$10.9	\$12.4	\$2.5
Total Exports	\$464.9	\$512.4	\$583.0	\$118.1

During the same 1993-95 interval, the total value of goods exported from the ARC states increased by just under 24 percent—from \$127 billion to \$157 billion, a rate of increase slightly below the national average. Clearly, ARC states participated in the nation's expanded export activity but have not led that growth. In contrast to national trends, the ARC states' combined totals showed little variation among the rates of growth for manufactured goods and for commodities, while the percentage increase in miscellaneous goods exports was less than half that for the other categories. Table 3 shows recent trade data for the combined ARC states.

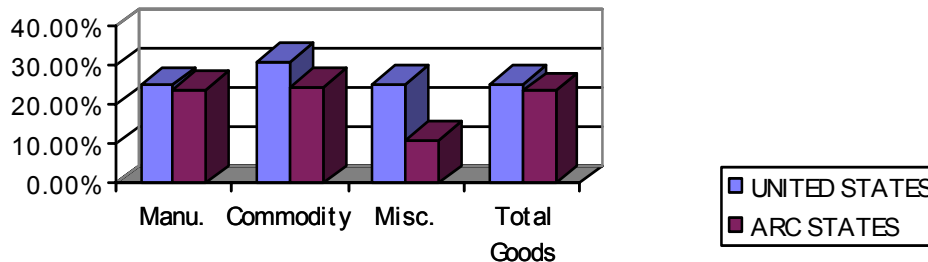
**Table 3**  
**Total Value of Goods Exported, ARC States, 1993-1995 (Billion of dollars)**

TYPE OF GOODS	1993	1994	1995	'93-'95 Change
Manufactured Goods	\$116.7	\$127.7	\$144.7	\$28.0
Commodities	\$6.6	\$6.7	\$8.2	\$1.6
Misc. w/Scrap & Waste	\$3.6	\$3.7	\$4.0	\$0.4
Total Exports Of Goods	\$126.9	\$138.1	\$156.9	\$30.0

The slower growth rate for 1993-1995 goods exports from ARC member states suggests that the region is not making progress toward its target, the national average. However, this data describes trends in entire states, and except for West Virginia, only portions of these states lie within the ARC region. More detailed analysis is needed to assess with greater certainty whether or not the ARC is indeed losing ground rather than gaining on the national average.

Figure 1 illustrates in more detail differences between recent export trends in the three major categories of exported goods among ARC states and for the national as a whole. The ARC states' rate of increase in the value of goods exported was lower than the national average in every category. The deficit is smallest for manufactured goods.

**Figure 1**  
**Rate of Increase in Exports**  
**1993-1995**



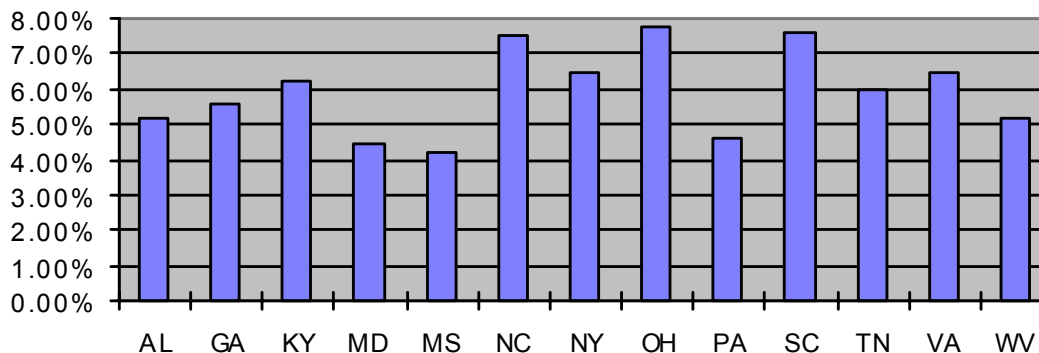
### Export Intensity

Because the size of economies vary among ARC states, it is difficult to compare state exporting performance. One means for adjusting for size differences is to calculate the value of exports from a state as a percentage of its gross product (i.e., the total value of goods and services produced by the state). The resulting percentage describes the contribution of income from exports to the total economy. It also provides a basis for comparing ARC states to one other and to a national average. Figure 2 shows the export intensity for the ARC states for 1993-1995.

It shows, for example, that North Carolina, South Carolina, and Ohio were the only ARC states with an export intensity near or above the national average of 7.5 percent. The export intensity for the combined ARC states was 6.2 percent, well below the national average. Thus, most ARC state economies have received less benefit from export sales than average. The region-wide deficit in export intensity shows that the ARC states stand to benefit economically from increasing their export performance to the national level.

**Figure 2**

### Export Intensity ARC States 1993-95



To facilitate comparisons of the ARC states' export performance with the national average over time, export intensity can be portrayed as an index relative to the national export intensity. A state with an export intensity greater than the U.S. average will have an export intensity index (EII) greater than 1.0, while a state where exports contribute a below average share of gross state product has an EII below 1.0. Changes over time in a state or regional EII reflect a change in the contribution of goods sold abroad to the state or regional economy that is greater (an increasing EII) or less (a decreasing EII) than the national average. Table 4 lists the EII for each ARC member state for 1993 through 1995.

**Table 4**  
**Export Intensity Index 1993-1995**

STATE	1993	1994	1995
Alabama	0.65	0.69	0.71
Georgia	0.67	0.75	0.80
Kentucky	0.81	0.84	0.82
Maryland	0.62	0.60	0.56
Mississippi	0.52	0.52	0.62
North Carolina	0.91	1.02	1.06
New York	0.97	0.83	0.81
Ohio	1.04	1.05	1.01
Pennsylvania	0.61	0.61	0.61
South Carolina	0.95	1.00	1.07
Tennessee	0.74	0.81	0.81
Virginia	0.86	0.87	0.87
West Virginia	0.64	0.66	0.74
All ARC States	0.83	0.82	0.82

Ohio was the only ARC state with a 1993 EII greater than one, but by 1995, both Carolinas had joined Ohio in exceeding the national average. Nine of the 13 ARC states posted increases in their EIIs between 1993 and 1995, which means that their export intensity increased more rapidly than the national average. One of the states with a declining EII was Ohio, but it remained just above one.

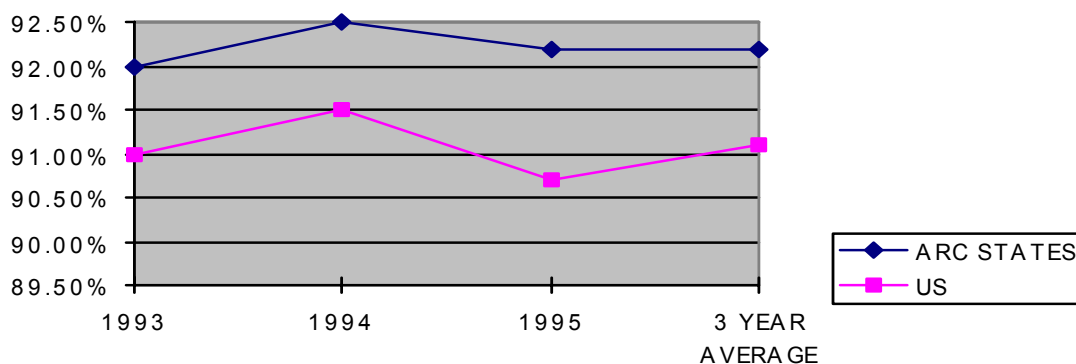
The strong increases that several states recorded in their export performance as measured by the EII suggests that these states are taking advantage of the opportunities offered by the growth in international trade. The fact that the majority of ARC states still have an EII below one indicates that there is a significant opportunity to improve the state economy by increasing export activity among the states' goods producing industries.

## Manufactured Exports

For both the United States and the states in the ARC region, manufactured goods are the largest part of exported goods, accounting for over ninety cents of every dollar received by selling goods abroad. Clearly, manufacturing industries are both the key to the U.S. export activity and in a position to benefit from increased export sales. Manufactured goods comprise a slightly higher proportion by value of goods exported from the ARC states than from the U.S. as a whole. The proportions vary slightly from year to year, but the relationship was constant from 1993 to 1995. Figure 3 compares the proportion of manufactured products among goods exported.

**Figure 3**

### **Manufactured Products as a Percent of Goods Exported, 1993-1995**



The predominance of manufactured products among goods exported improves the export prognosis for ARC states. If recent growth trends in manufactured exports rather than total exports are considered, ARC states as a group are experiencing a growth rate only one percentage point below the national average.

**Table 5**  
**Manufactured (SIC 20-39) Exports from ARC States (millions of dollars)**

<b>State</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1993-95 Increase</b>
Alabama	\$3,526	\$4,252	\$4,869	\$1,343
Georgia	\$7,391	\$9,212	\$11,397	\$4,006
Kentucky	\$4,393	\$5,091	\$5,603	\$1,210
Maryland	\$5,152	\$5,708	\$5,974	\$822
Mississippi	\$1,764	\$1,956	\$2,581	\$817
North Carolina	\$10,288	\$12,880	\$15,576	\$5,288
New York	\$33,416	\$30,998	\$34,077	\$661
Ohio	\$18,558	\$20,770	\$22,629	\$4,071
Pennsylvania	\$11,778	\$12,946	\$14,468	\$2,690
South Carolina	\$4,996	\$5,829	\$7,060	\$2,064
Tennessee	\$5,982	\$7,134	\$8,045	\$2,063
Virginia	\$8,438	\$9,706	\$11,012	\$2,574
West Virginia	\$1,030	\$1,226	\$1,376	\$346
All ARC states	\$116,712	\$127,711	\$144,666	\$27,955

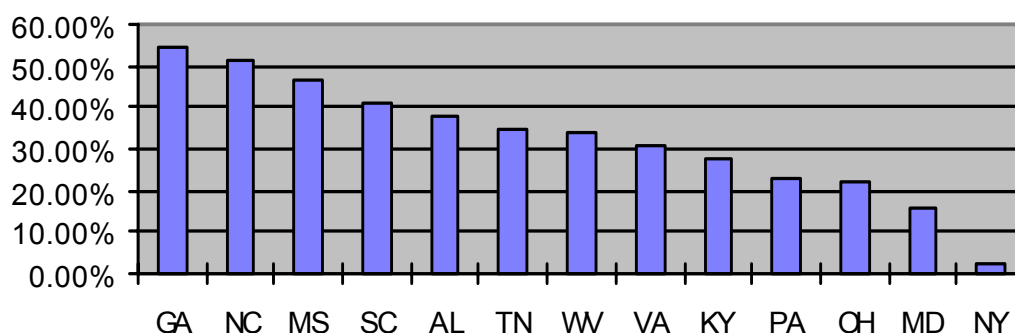
There is great variation in the value of manufactured exports among the states that comprise the ARC region. Much can be attributed to large differences in the scale of state economies and manufacturing bases. Not surprisingly, New York is the largest exporter—because it is the largest economy. Recent growth trends in the value of goods exported also vary widely among ARC member states. North Carolina experienced growth of over \$5 billion in the value of manufactured exports, while several states experienced increases of less than one billion. Table 5 lists recent trends by state and reveals the large differences in exporting scale and experience among the states' manufacturing economies.

Comparing rates rather than absolute values of increases in the value of manufactured exports allows comparisons among states despite different sized economies. It also allows comparisons with national performance, which was 25 percent in the value of manufactured exports. Figure 4 shows how ARC states rank on this measure.



Figure 4

### ARC States Ranked by 1993-95 Growth in Manufactured Exports



Most ARC states experienced faster than (national) average growth in export sales of manufactured goods. The regional growth rate for manufactured exports was 24 percent, only one percent below the national average. Slow growth (less than one-tenth of the regional average) in New York, the largest state economy, depressed the region's overall rate of growth. However there is no consistent relationship between size and rates of export growth. Rather, differences in 1993-95 export growth rates follow geographic divides. Southern states posted the fastest rates of growth in value of manufactured exports. Each gained above the regional average, as did the "border" states of West Virginia and Kentucky. Conversely northern states plus the border state of Maryland all experienced relatively slow growth. In summary, there is no consistent exporting experience within the ARC states. Most perform below the national average. Most are exporting at a rate above the national average. In other words, most ARC states are making progress toward the regional goal of "increasing export performance up to the national average."

The ARC selected seven industries to be the targets of regional export promotion. Six of the target industries identified by the Appalachian Regional Commission are manufacturing industries, while the seventh, environmental technologies, includes both manufacturing and service components. Table 6 lists the six industries targeted by ARC for further study that are defined by SIC codes.

**Table 6**  
**ARC Target Industries by SIC Code**

<b>TARGET INDUSTRY</b>	<b>SIC CODE</b>
Knitting mills	SIC 225
Household furniture	SIC 251
Misc. plastics products	SIC 308
Industrial machinery	SIC 354, 355, 356, 359
Electronic components	SIC 367
Medical instruments	SIC 384
Environmental technologies	See Appendix A

Our analysis is restricted by the fact that the MISER data reports the value and destination of exports from each state only by two-digit SIC industry. For the six target industries that are defined by three-digit SIC codes, the two-digit SIC industry that includes the target industry must be used to approximate broad trends for the three-digit clusters. For environmental technologies, which cannot be approximated by a two-digit SIC, the analysis relies on data commissioned by the International Trade Administration and supplied by Environmental Business International, Inc. Specific data sources are described in more detail in Appendix G.

## **F. Who Exports What and Where?**

Nationally, about 37 percent of all exporting is done by SMEs (companies with fewer than 500 employees), and 80 percent of all exporting is by manufacturing sectors. Arthur Anderson, Inc. estimates that one fourth of all firms with fewer than 100 employees export. Further, some types of products are more prone to be exported than others. A recent study for the ARC found that Chemicals and Machinery and Computer Equipment account for about a fifth of the region's exports.<sup>9</sup> These two sectors, plus electronics and transportation equipment, exhibited high growth between 1983 and 1991 as well.

The Kenan Institute report concludes that four in ten SME export dollars in the ARC region are in three sectors—industrial machinery, electronic equipment, and chemicals. At the three-digit SIC level, the top six exporting sectors are plastics materials and synthetic resins (2820); motor vehicles, equipment, and parts (3710); industrial organic chemicals (2860); electronic components and accessories (3670); computer and office equipment (3570); and construction and related machinery (3530). These six clusters account for more than 30 percent of the region's exports. Lower value sectors such as household furniture (ranked 1st) and men's and boy's clothing (ranked 2nd) employ many more people in Appalachia but export much less.

Despite efforts to promote exports ubiquitously, all companies do not have the same potential or predilection to export. In general, the farther down the supply chain a company is situated, the lower its value added, the more closely it works with its customers, and the less likely it is to be an exporter. Knitting mills that produce gray goods for the finishers, for example, and tool and die companies that serve fabricators are not likely to be exporters.

Further, the size of a company is directly related to the probability it exports, although not necessarily its success in exporting. Larger companies that have greater internal specialization and production capacity, and more resources are more apt to export. Globally, mid-sized, family owned firms are well represented among the most entrepreneurial and dynamic companies. In Germany, these mittlestand firms are the most successful segment of the economy, and in Italy the *media industria* are quickly gaining the same reputation.<sup>10</sup> In Appalachia, too, such mid-sized firms have been found to be regional leaders, and on average, the firms surveyed and identified as exporters as part of this research are larger than the non-exporters.

Management is also a key factor in export performance. A study of the wood products industry in the northwest United States found that the greater managers' innovativeness and knowledge, the greater the export performance.<sup>11</sup> Another recent study based on environmental technology industries found that learning-oriented firms and managers who are optimistic about the future are more likely to be exporters.<sup>12</sup> Although we were unable to formally test this hypothesis, the interviews with exporters appear to confirm this. They tended to be much more enthusiastic about the future and more open to new ideas.

## **Where are the Emerging Markets?**

Companies are able to draw on a wealth of information from both the public and private sectors about current and emerging foreign markets for their general types of products. These reports provide current dollar amounts, rates of exports, and patterns over time for particular countries or groups of countries such as the European Union or Asian "newly industrialized countries" (NICs). Although this general information alone does not produce customers, it suggests where to direct marketing resources. Following are summaries of ARC's key clusters.

**Industrial machinery** is an active exporting sector with roughly a quarter of its production sent out of the country. Half of its exports in 1995 were to five countries—Canada, Mexico, Japan, Germany, and Korea. These five, along with Italy and Japan, are also major competitors of U.S. firms. The largest increases in exports from 1994 to 1995 were to competitor nations Korea, Germany, and Japan—mainly in special market niches. Japan, for example, imports special semi-conductor and filtering equipment from the U.S. and Korea is a customer for non-metalworking machine tools, gas turbines, and thermal processing equipment.

**Environmental technologies** have growing global markets driven by increasing desires for pollution prevention and cleanup. They is already estimated at \$408 billion. The most promising markets for remediation technologies over the next five years are expected to be Germany, Mexico, and Korea. Mexico now imports about 28 percent of all its pollution prevention equipment from the U.S., Canada imports 30 percent, and Korea imports nine percent of its environmental technologies. The Canadian market tends to be smaller firms, and its government is encouraging alliances or networks with U.S. companies to address environmental needs holistically. Five to ten years from now, Brazil, China and India are expected to be prime markets because of their investments in nuclear power.

**Plastic parts** exported \$6.7 billion worth of goods in 1995, which was more than 50 percent higher than its total exports for 1992. This sector had a net trade surplus of \$1.5 billion. Most

plastics parts are inputs to other industries—particularly electronics, health care, construction, transportation, automotive, and food packaging firms. The leading exporters are large, international, and vertically integrated companies. Much of the industry's growth is due to increased replacement of other materials by plastics to improve design and reduce weight and costs. Major threats to growth are environmental awareness and regulations, especially in the European Union countries. The fastest growing markets are expected to be in NAFTA members Mexico and Canada; Mexico is projected to increase annually by 10 percent and Canada by 12 percent.

**Electronic components** firms annually export about a quarter of their output, which was \$45.5 billion in 1995. Japan, Singapore, Canada, Mexico, and Taiwan are major markets. Yet the U.S. overall is a net importer of electronic equipment. Including computers, computer peripherals, and parts, the U.S. had a trade deficit of \$11.1 billion in 1995, exporting approximately \$129.5 billion and importing \$177.1 billion. The electronic component industry has grown significantly over the last four years and, with increasing demand for electronic equipment such as HDTV and computers, the market is expected to continue to grow.

**Household furniture's** major markets are in the NAFTA countries, Europe (especially Germany), the Middle-East, and Japan. The U.S. furniture export market is quite highly developed in Canada and Mexico, and moderately developed in Europe and the Middle East but underdeveloped in Latin America and Asia. South America is also emerging as an importer of furniture as trade barriers are lowered and disposable income grows. The best prospects for overseas markets are generally believed to be high-end branded furniture, although this analysis suggests that there is a large, growing potential market for well-made promotional furniture among the middle classes in newly developed economics.

Combining several **knit sub-sectors** (hosiery, fabric, and shirts), U.S. exports were \$1.35 billion in 1995. While exports are growing to some countries, the industry is not generally considered a significant exporter. In 1993, for example, the U.S. exported only about five percent of U.S. hosiery production. Several strong markets are Canada, Mexico, Japan, and the United Kingdom where "American casual" styles are popular among middle and upper income classes. (The U.S. Department of Commerce's trade data does not directly coincide with SIC codes. Also, these data are distorted by "maquiladora production," where workers partially produce goods in the United States which are then finished in Mexico or Caribbean nations, then re-imported for sale in the United States.)

**Table 7**  
**Total Value of Export, in Millions of Dollars, and Emerging Foreign Markets**

<b>Cluster</b>	<b>Exports 1993</b>	<b>Exports 1995</b>	<b>Promising Markets</b>
Industrial Machinery	n/a	30,692	Canada, Mexico, Japan, Germany, and Korea
Plastics Parts	\$4,471	\$6,774	Canada, Mexico, Japan, Netherlands
Environmental Technologies	n/a	\$10,800 (1994, est.)	Canada, Mexico, Japan, France, Korea
Electronic Components	\$62,343	\$92,203	Japan, Taiwan, Singapore, Canada, and Mexico
Household Furniture	\$1,183	\$1,320	Canada, Mexico, Germany, Japan, Brazil, Saudi Arabia
Knitting Mills	\$324	\$441	United Kingdom, Canada, Mexico, Japan
Medical Devices	\$7,632 (1992)	\$10,281	Japan, Canada, France, Korea, Brazil